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**Warning:** We are in the process of changing documentation format as well as hosting mechanism. Please be patient with us as we migrate our entire documentation to this new setup.

This document contains information specific to this release of CloudStack, including upgrade instructions from prior releases, new features added to CloudStack, API changes, and issues fixed in the release. For installation instructions, please see the Installation Guide. For usage and administration instructions, please see the CloudStack Administrator’s Guide.

Contents:
1.1 What’s New in 4.3

CloudStack 4.3 includes the following new features.

1.1.1 Optional 64-Bit System VM Template Support

CloudStack now provides 64-bit templates for System VMs. With this support, you will be able to upgrade virtual routers in a zone. The following parameters have been introduced for the same purpose:

- XenServer: ‘router.template.xen’
- KVM: ‘router.template.kvm’
- VMware:
- Hyper-V:

1.1.2 Hyper-V Support

CloudStack 4.3 rolls out support for Hyper-V hosts. For Hyper-V, CloudStack supports SMB-based storage. If you want to run guest VMs on Hyper-V hosts, install CloudStack Agents on each Hyper-V hosts. Before you use Hyper-V, review the following list of supported and non-supported features. For detailed instruction, see Hyper-V Quick Start Guide. You can also see the chapter Installing Hyper-V for CloudStack in the CloudStack 4.3 Installation Guide.

Supported Functionalities on Hyper-V

- VM Compute
  - All the VM operations, except VM Snapshots
  - Live Migration
  - Service Offerings (Scale up on stopped VMs)
  - Console access
  - SSH key and resetting SSH key
  - Upload and download templates, volumes, and ISO
  - Create VMs from template and ISO
– Create template from volume
– Attach and detach VMs from ISO and password-enabled template
– Copy template across zone

• Storage
  – Primary Storage (SMB and Local)
  – Root and data volumes on Local and SMB
  – Add, delete, attach, detach volumes (one or more volumes per VM)
  – Single and multiple secondary storage (SMB)

• Network
  – VLANs (Isolated and Shared)
  – All VR services: DNS, DHCP, SourceNAT, LB, PF, Firewall, StaticNAT, Userdata, and VPN
  – External device support for both Isolated and Shared networks: Netscaler, SRX, F5
  – Multiple physical networks
  – Dedicated IP range, Public VLANs (to account)
  – Network Offering upgrades and updates
  – L4-L7 services in Shared network
  – Multiple IP ranges and portable IPs

• Host and Storage in maintenance mode

Unsupported Functionalities on Hyper-V

• Affinity an Anti-Affinity Groups
• Network throttling
• Security groups (Advanced Zone)
• IPv6
• Snapshot: VM and disk
• PVLAN
• VPC
• HA of guest VMs
• Redundant VR
• Object Store
• Mixed hypervisor zone
• Zone-wide Primary storage
• NIC bonding
1.1.3 Enhanced Upgrade for Virtual Routers

Upgrading VRs is made flexible. The CloudStack administrators will be able to control the sequence of the VR upgrades. The sequencing is based on Infrastructure hierarchy, such as by Cluster, Pod, or Zone, and Administrative hierarchy, such as by Tenant or Domain. This implies, for example, that you will have the flexibility to upgrade a VR in a specified zone. As an administrator, you can also determine when a particular VR can be upgraded within a specified upgrade interval. Additionally, upgrade operation is enhanced to increase the upgrade speed by allowing as many upgrade operations in parallel as possible. During the entire duration of the upgrade, users cannot launch new services or make changes to an existing service.

To support this feature, a new API, upgradeRouterTemplate, has been introduced.

The detailed instruction is provided in the CloudStack 4.3 Administration Guide. See section 17.5.5. Enhanced Upgrade for Virtual Routers.

1.1.4 Service Monitoring Tool for Virtual Router

Various services running on the CloudStack virtual routers can be monitored by using a Service Monitoring tool. The tool ensures that services are successfully running until CloudStack deliberately disables them. If a service goes down, the tool automatically performs a restart, and if that does not help bringing up the service, an alert as well as an event is generated indicating the failure.

The following services are monitored in a VR:

- DNS
- HA Proxy
- SSH
- Apache Web Server

Only the services with daemons are monitored.

The following networks are supported:

- Isolated Networks
- Shared Networks in both Advanced and Basic zone

This feature is supported on the following hypervisors: XenServer, VMware, and KVM.

The detailed instruction is provided in the CloudStack 4.3 Administration Guide. See section 17.5.4. Service Monitoring Tool for Virtual Router.

1.1.5 Custom Compute Offering

CloudStack provides you the flexibility to specify the desired values for the number of CPU, CPU speed, and memory while deploying a VM. The admin creates a Compute Offering by marking it as custom, and as an user, you will be able to customize this dynamic Compute Offering by specifying the memory, CPU and root disk at the time of VM creation or upgrade.

Custom Compute Offering is same as the normal Compute Offering except that the values of the dynamic parameters will be set to zeros in the given set of templates. Use this offering to deploy VM by specifying custom values for the dynamic parameters. Memory, CPU and number of CPUs are considered as dynamic parameters. Dynamic Compute Offerings can be used in following cases: deploying a VM, changing the compute offering of a stopped VM and running VMs, which is nothing but scaling up. To support this feature a new field, Custom, has been added to the Create Compute Offering page. If the Custom field is checked, the end-user will be able to create a custom Compute Offering by filling in the desired values for number of CPU, CPU speed, and memory.

1.1. What’s New in 4.3
1.1.6 Remote Access VPN for VPC

Support for Remote access VPN in Isolated networks is now extended to VPC networks. Remote users will now be able to initiate a VPN connection to a VPC network. To enable this feature, enable VPN in the Source NAT IP of the VPC.

1.1.7 Site to Site VPN Connection Between VPC Networks

CloudStack provides you with the ability to establish a site-to-site VPN connection between CloudStack virtual routers. With this functionality, users can deploy applications in multiple Availability Zones or VPCs, which can communicate with each other by using a secure Site-to-Site VPN Tunnel. Creating a typical Site to Site VPN connection between VPC networks involves the following:

1. Create two VPCs. For example, VPC A and VPC B.
2. Create VPN gateways on both the VPCs you created.
3. Create VPN customer gateway for both the VPCs.
4. Enable a VPN connection on VPC A in passive mode.
   Ensure that the customer gateway is pointed to VPC B. The VPN connection is shown in the Disconnected state.
5. Enable a VPN connection on VPC B.
   Ensure that the customer gateway is pointed to VPC A. Because virtual router of VPC A, in this case, is in passive mode and is waiting for the virtual router of VPC B to initiate the connection. The virtual router of VPC B should not be in passive mode.
   The VPN connection is shown in the Disconnected state.
   Creating VPN connection on both the VPCs initiates a VPN connection. Wait for few seconds. The default is 30 seconds for both the VPN connections to show the Connected state.

1.1.8 Reporting CPU Sockets

CloudStack now provides an additional infrastructure statistics for CPU sockets managed by CloudStack, which in turn reflects the size of the cloud. The Infrastructure tab has a new tab for sockets. The Socket page will give you the number of hosts an sockets used for each hypervisor type. This feature is not supported in versions prior to XenServer 6.2.

1.1.9 Database High Availability

To help ensure high availability of the databases that store the internal data for CloudStack, you can set up database replication. This covers both the main CloudStack database and the Usage database. Replication is achieved using the MySQL connector parameters and two-way replication. Tested with MySQL 5.1 and 5.5. Database replication in CloudStack is provided using the MySQL replication capabilities. The steps to set up replication can be found in the MySQL documentation.

1.1.10 LDAP User Provisioning

LDAP user provisioning has been enhanced by allowing user import from the configured LDAP servers. You will be able to add multiple LDAP servers and selectively import LDAP users. You can filter by group name and import all the users within a group. After they have been imported to CloudStack, in contrast to manually adding them in previous releases, users are allowed to directly log in to CloudStack by using the LDAP credentials.
1.1.11 Migrating NFS Secondary Storage to Object Store

In an existing zone that is using NFS for secondary storage, you can upgrade the zone to use a region-wide object storage without causing downtime. The existing NFS storage in the zone will be converted to an NFS Staging Store. After migration, the data that was on the NFS storage remains there. CloudStack does not provide a way to automatically migrate all data to the new object storage. The data remaining on the old NFS storage will remain accessible for read and delete operations only. Newly created snapshots and templates will be placed in the newly configured object storage.

1.1.12 VXLAN Plugin Support

The VXLAN plugin adds VXLAN as one of the guest network isolation methods in CloudStack. This plugin enables more than 4096 isolated guest networks in a Zone, with almost the same usability as VLAN isolation. This plugin provides no network services. Use virtual router for network services. This plugin is supported on KVM hypervisors.

1.1.13 Contrail Network Plugin Support

The Contrail virtual network controller is an open source project that provides an overlay implementation of network virtualization that is interoperable with network devices that support existing network virtualization standards. Support for the Contrail plugin has been added to CloudStack to provide NAT services to the XenServer hosts. The plugin supports isolated networks, Static NAT implemented by the VRouter dataplane, and Source NAT implemented by using a virtual appliance with full NAT functionality.

1.1.14 Publishing Alert Using the Web ROOT Admin API

In previous releases of CloudStack code alerts are generated for CloudStack services (Usage service) only if they run on the same host as the Management Server. A new API has been introduced in 4.3, which can be used by the following services to generate and publish. The services need not be running on the same host where the Management Server is running.

- Any new services added to CloudStack.
- Usage service when run on a separate storage host.
- Console Proxy and Secondary Storage VM services.

The main advantage of this feature is that the third party systems integrating with CloudStack will be able to utilize the Alert notification system publish alerts.

1.1.15 Support for Palo Alto Firewall Service

CloudStack supports Palo Alto firewall services. Use the Create Network Offering dialog to create an offering which has the Palo Alto firewall services. What is not supported and not supported are given below:

Supported Functionalities

- Advanced Network
- Parallel deployment with hardware Load balancer
- Virtual Palo Alto firewall.
- Communication layer with Palo Alto APIs.
• Mapping of CloudStack APIs to corresponding Palo Alto APIs.
• Connectivity status of the firewall service on the CloudStack UI.

Unsupported Functionalities

• Inline deployment with hardware Load balancer
• Firewall between VLANs within an advanced network
• Firewall between VM instances

For more information, see Palo Alto Firewall Integration.

1.1.16 Root Volume Metering

CloudStack supports recording usage events as per the dynamically assigned resources. Usage events are registered when a VM is created from dynamic service offering, and the values of parameters, such as CPU, speed, RAM are recorded. If VM is deployed by using template and dynamic root disk size is mentioned, the same value is recorded in the usage event.

1.1.17 Support for SSL Termination

SSL Offloading allows load balancers to handle encryption and decryption of HTTP(s) traffic giving plain text HTTP to the back end servers freeing them from the resource intensive task of handling encryption and decryption. Supported for Citrix NetScaler.

1.1.18 Support for Pluggable VM Snapshots

CloudStack implements a plugin to integrate a third-party storage provider. Third party storage providers can integrate with CloudStack to provide either primary storage or secondary storage. The user enables a storage plugin through the UI. A new dialog box choice is offered to select the storage provider. Depending on which provider is selected, additional input fields may appear so that the user can provide the additional details required by that provider, such as a user name and password for a third-party storage account.

1.1.19 Enhanced CloudStack UI

A complete UI makeover is implemented to enhance the usability and user experience in modern browsers. The visual look-and-feel has been changed for the Header, Navigation, Buttons, text fields, drop-downs, tables and so on. Consistent color themes has been introduced to match with the Apache branding.

The current UI flow remains the same.

1.1.20 Depreciation of realhostip.com DNS and SSL certificate

The realhostip.com dynamic DNS resolution service is being retired this summer. In advance of that, CloudStack 4.3 no longer uses realhostip.com DNS domains or SSL certificates to encrypt Console Proxy or file copy communications.
## 1.2 Issues Fixed in 4.3.0

Apache CloudStack uses Jira to track its issues. All new features and bugs for 4.3 have been tracked in Jira, and have a standard naming convention of “CLOUDSTACK-NNNN” where “NNNN” is the issue number.

For the list of issues fixed, see Issues Fixed in 4.3.

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<td>CLOUDSTACK-4371</td>
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1.2. Issues Fixed in 4.3.0

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### 1.3 Known Issues in 4.3.0

Apache CloudStack uses Jira to track its issues. All new features and bugs for 4.3 have been tracked in Jira, and have a standard naming convention of “CLOUDSTACK-NNNN” where “NNNN” is the issue number.

For the list of known issues, see Known Issues in 4.3.

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### 1.3. Known Issues in 4.3.0

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<tr>
<td>CLOUDSTACK-5309</td>
<td>version number and requires upgrade fields are not displayed for routers when na...</td>
</tr>
<tr>
<td>CLOUDSTACK-5383</td>
<td>[UI] “root disk size” field should be removed from the add instance wizard since ...</td>
</tr>
<tr>
<td>CLOUDSTACK-5524</td>
<td>Multiselect actions are not reset when a multiselect action is performed...</td>
</tr>
<tr>
<td>CLOUDSTACK-5824</td>
<td>Delete snapshot UI always success...</td>
</tr>
<tr>
<td>CLOUDSTACK-5885</td>
<td>When process receives error, loading overlay on listview element does not disapp...</td>
</tr>
<tr>
<td>CLOUDSTACK-5912</td>
<td>WARN [c.c.v.m.HtpNfcLeaseMO] (Thread-28: null) Unexpected exception...</td>
</tr>
<tr>
<td>CLOUDSTACK-5522</td>
<td>Need of one more column i.e., “Name” at Home&gt;Storage - Snapshots...</td>
</tr>
<tr>
<td>CLOUDSTACK-5904</td>
<td>Small UI bug...</td>
</tr>
</tbody>
</table>
Compatibility Matrix

2.1 Supported OS Versions for Management Server

This section describes the operating systems, browsers, and hypervisors that have been newly tested and certified compatible with CloudStack 4.3. Most earlier OS and hypervisor versions are also still supported for use with 4.3. It might work well on other platforms, but the platforms listed below are the ones that are specifically tested against and are more likely to be able to help troubleshoot if you run into any issues.

**Note:** that specific versions of the operating systems are tested, so compatibility with CentOS 6.3 may not indicate compatibility with CentOS 6.2, 6.1 and so on.

- RHEL versions 5.5, 6.2, 6.3, and 6.4
- CentOS versions 6.3, and 6.4
- Ubuntu 12.04 LTS

2.2 Supported Hypervisor Versions

CloudStack supports three hypervisor families, XenServer with XAPI, KVM, and VMware with vSphere.

- Windows Server 2012 R2 (with Hyper-V Role enabled)
- Hyper-V 2012 R2
- CentOS 6.2 with KVM
- Red Hat Enterprise Linux 6.2 with KVM
- XenServer 6.0.2 (with Hotfix)
- XenServer versions 6.1 and 6.2 SPI with latest hotfixes
- VMware versions 5.0, 5.1, and 5.5
- Bare metal hosts are supported, which have no hypervisor. These hosts can run the following operating systems:
  - RHEL or CentOS, v6.2 or 6.3

**Note:** Use libvirt version 0.9.10 for CentOS 6.3

- Fedora 17
– Ubuntu 12.04

For more information, see the Hypervisor Compatibility Matrix in the CloudStack Installation Guide.

### 2.3 Supported External Devices

- Netscaler VPX and MPX versions 9.3 and 10.e
- Netscaler SDX version 9.3
- SRX (Model srx100b) versions 10.3 or higher
- F5 10.1.0 (Build 3341.1084)

### 2.4 Supported Browsers

The CloudStack Web-based UI should be compatible with any modern browser, but it’s possible that some browsers will not render portions of the UI reliably, depending on their support of Web standards. For best results, one of the following browsers recommended:

- Internet Explorer versions 10 and 11
- Firefox version 26 or lower
- Google Chrome version 31
- Safari 5
Upgrade Instructions for 4.3

This section contains upgrade instructions from prior versions of CloudStack to Apache CloudStack 4.3. We include instructions on upgrading to Apache CloudStack from pre-Apache versions of Citrix CloudStack (last version prior to Apache is 3.0.2) and from the releases made while CloudStack was in the Apache Incubator.

If you run into any issues during upgrades, please feel free to ask questions on users@cloudstack.apache.org or dev@cloudstack.apache.org.

3.1 Validate 4.3 source code tarball

1. Perform the following to verify the artifacts:
   (a) (optional) Install GPG keys if needed:
       $ sudo apt-get install gpg
   (b) Import the GPG keys stored in the source distribution’s KEYS file
       $ gpg --import KEYS
       Alternatively, download the signing keys, the IDs found in the KEYS file, individually by using a keyserver.
       For example:
       $ gpg --recv-keys CC56CEA8
   (c) Verify signatures and hash files:
       $ gpg --verify apache-cloudstack-4.3-src.tar.bz2.asc
       $ gpg --print-md MD5 apache-cloudstack-4.3-src.tar.bz2 | diff - apache-cloudstack-4.3-src.tar.bz2.md5
       $ gpg --print-md SHA512 apache-cloudstack-4.3-src.tar.bz2 | diff - apache-cloudstack-4.3-src.tar.bz2.sha
       Each of these commands should return no output. Any output from them implies that there is a difference between the hash you generated locally and the hash that has been pulled from the server.
   (d) Get the commit hash from the VOTE email.
       For example: 4cd60f3d1683a3445c3248f48ae064fb573db2a1. The value changes between releases.
   (e) Create two new temporary directories:
       $ mkdir /tmp/cloudstack/git
       $ mkdir /tmp/cloudstack/tree
CloudStack Release Notes Documentation, Release 4.3.0

(f) Check out the 4.3 branch:

$ git clone https://git-wip-us.apache.org/repos/asf/cloudstack.git /tmp/cloudstack/git
$ cd /tmp/cloudstack/git
$ git archive --format=tar --prefix=/tmp/cloudstack/tree/ <commit-hash> | tar Pxf -

(g) Unpack the release artifact:

$ cd /tmp/cloudstack
$ tar xvfj apache-cloudstack-4.3-src.tar.bz2

(h) Compare the contents of the release artifact with the contents pulled from the repo:

$ diff -r /tmp/cloudstack/apache-cloudstack-4.3-src /tmp/cloudstack/tree

Ensure that content is the same.

(i) Verify the Code License Headers:

$ cd /tmp/cloudstack/apache-cloudstack-4.3-src
$ mvn --projects='org.apache.cloudstack:cloudstack' org.apache.rat:apache-rat-plugin:0.8:check

The build fails if any non-compliant files are present that are not specifically excluded from the ASF license header requirement. You can optionally review the target/rat.txt file after the run completes. Passing the build implies that RAT certifies that the files are compliant and this test is passed.

3.2 Upgrade from 4.2.x to 4.3

This section will guide you from CloudStack 4.2.x to CloudStack 4.3.

Any steps that are hypervisor-specific will be called out with a note.

We recommend reading through this section once or twice before beginning your upgrade procedure, and working through it on a test system before working on a production system.

Note: The following upgrade instructions should be performed regardless of hypervisor type.

1. (a) While running the existing 4.2.x system, log in to the UI as root administrator.
   (b) In the left navigation bar, click Templates.
   (c) In Select view, click Templates.
   (d) Click Register template.

   The Register template dialog box is displayed.

   (e) In the Register template dialog box, specify the following values (do not change these):
CloudStack Release Notes Documentation, Release 4.3.0

<table>
<thead>
<tr>
<th>Hypervisor</th>
<th>Description</th>
</tr>
</thead>
</table>
| XenServer  | Name: systemvm-xenserver-4.3  
Description: systemvm-xenserver-4.3  
Zone: Choose the zone where this hypervisor is used  
Hypervisor: XenServer  
Format: VHD  
OS Type: Debian GNU/Linux 7.0 (64-bit) (or the highest Debian release number available in the dropdown)  
Extractable: no  
Password Enabled: no  
Public: no  
Featured: no |
| KVM        | Name: systemvm-kvm-4.3  
Description: systemvm-kvm-4.3  
Zone: Choose the zone where this hypervisor is used  
Hypervisor: KVM  
Format: QCOW2  
OS Type: Debian GNU/Linux 7.0 (64-bit) (or the highest Debian release number available in the dropdown)  
Extractable: no  
Password Enabled: no  
Public: no  
Featured: no |
| VMware     | Name: systemvm-vmware-4.3  
Description: systemvm-vmware-4.3  
Zone: Choose the zone where this hypervisor is used  
Hypervisor: VMware  
Format: OVA  
OS Type: Debian GNU/Linux 7.0 (64-bit) (or the highest Debian release number available in the dropdown)  
Extractable: no  
Password Enabled: no  
Public: no  
Featured: no |

2. Most users of CloudStack manage the installation and upgrades of CloudStack with one of Linux’s predominant package systems, RPM or APT. This guide assumes you’ll be using RPM and Yum (for Red Hat Enterprise Linux or CentOS), or APT and Debian packages (for Ubuntu).

3. Create RPM or Debian packages (as appropriate) and a repository from the 4.3 source, or check the Apache CloudStack downloads page at http://cloudstack.apache.org/downloads.html for package repositories supplied by community members. You will need them for step 8 or step 11.

Instructions for creating packages from the CloudStack source are in the Installation Guide.

4. Stop your management server or servers. Run this on all management server hosts:

3.2. Upgrade from 4.2.x to 4.3  
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5. If you are running a usage server or usage servers, stop those as well:

   $ sudo service cloudstack-usage stop

6. Make a backup of your MySQL database. If you run into any issues or need to roll back the upgrade, this will assist in debugging or restoring your existing environment. You’ll be prompted for your password.

   $ mysql -u root -p cloud > cloudstack-backup.sql

7. (KVM Only) If primary storage of type local storage is in use, the path for this storage needs to be verified to ensure it passes new validation. Check local storage by querying the cloud.storage_pool table:

   $ mysql -u cloud -p -e "select id,name,path from cloud.storage_pool where pool_type='Filesystem'"

   If local storage paths are found to have a trailing forward slash, remove it:

   $ mysql -u cloud -p -e 'update cloud.storage_pool set path="/var/lib/libvirt/images" where path="/var/lib/libvirt/images/"';

8. If you are using Ubuntu, follow this procedure to upgrade your packages. If not, skip to step 11.

   **Note: Community Packages:** This section assumes you’re using the community supplied packages for CloudStack. If you’ve created your own packages and APT repository, substitute your own URL for the ones used in these examples.

   (a) The first order of business will be to change the sources list for each system with CloudStack packages. This means all management servers, and any hosts that have the KVM agent. (No changes should be necessary for hosts that are running VMware or Xen.)

   Start by opening `/etc/apt/sources.list.d/cloudstack.list` on any systems that have CloudStack packages installed.

   This file should have one line, which contains:

   `deb http://cloudstack.apt-get.eu/ubuntu precise 4.2`

   We’ll change it to point to the new package repository:

   `deb http://cloudstack.apt-get.eu/ubuntu precise 4.3`

   If you’re using your own package repository, change this line to read as appropriate for your 4.3 repository.

   (b) Now update your apt package list:

   $ sudo apt-get update

   (c) Now that you have the repository configured, it’s time to upgrade the `cloudstack-management` package.

   $ sudo apt-get upgrade cloudstack-management

   (d) Now it’s time to start the management server

   $ sudo service cloudstack-management start

   (e) If you use it, start the usage server

   $ sudo service cloudstack-usage start
9. (VMware only) Additional steps are required for each VMware cluster. These steps will not affect running guests in the cloud. These steps are required only for clouds using VMware clusters:

   (a) Stop the Management Server:
   
   $ sudo service cloudstack-management stop

   (b) Generate the encrypted equivalent of your vCenter password:
   
   $ java -classpath /usr/share/cloudstack-common/lib/jasypt-1.9.0.jar org.jasypt.intf.cli.JasyptPBEStringEncryptionCLI encrypt.sh input="_your_vCenter_password_" password="'cat /etc/cloudstack/management/key'" verbose=false

   Store the output from this step, we need to add this in cluster_details table and vmware_data_center tables in place of the plain text password

   (c) Find the ID of the row of cluster_details table that you have to update:
   
   $ mysql -u <username> -p<password>

   select * from cloud.cluster_details;

   (d) Update the plain text password with the encrypted one

   update cloud.cluster_details set value = 'ciphertext_from_step_1' where id = _id_from_step_2_

   (e) Confirm that the table is updated:

   select * from cloud.cluster_details;

   (f) Find the ID of the correct row of vmware_data_center that you want to update

   select * from cloud.vmware_data_center;

   (g) update the plain text password with the encrypted one:

   update cloud.vmware_data_center set password = 'ciphertext_from_step_1' where id = _id_from_step_5_

   (h) Confirm that the table is updated:

   select * from cloud.vmware_data_center;

   (i) Start the CloudStack Management server

   $ sudo service cloudstack-management start

10. (KVM only) Additional steps are required for each KVM host. These steps will not affect running guests in the cloud. These steps are required only for clouds using KVM as hosts and only on the KVM hosts.

   (a) Configure the CloudStack apt repository as detailed above.

   (b) Stop the running agent.

   $ sudo service cloudstack-agent stop

   (c) Update the agent software.

   $ sudo apt-get update cloudstack-agent

   (d) Verify that the file /etc/cloudstack/agent/environment.properties has a line that reads:

   paths.script=/usr/share/cloudstack-common

   If not, add the line.
11. If you are using CentOS or RHEL, follow this procedure to upgrade your packages. If not, skip to step 14.

**Note: Community Packages:** This section assumes you’re using the community supplied packages for CloudStack. If you’ve created your own packages and yum repository, substitute your own URL for the ones used in these examples.

(a) The first order of business will be to change the yum repository for each system with CloudStack packages. This means all management servers, and any hosts that have the KVM agent.

(No changes should be necessary for hosts that are running VMware or Xen.)

Start by opening `/etc/yum.repos.d/cloudstack.repo` on any systems that have CloudStack packages installed.

This file should have content similar to the following:

```
[apache-cloudstack]
name=Apache CloudStack
baseurl=http://cloudstack.apt-get.eu/rhel/4.2/
enabled=1
gpgcheck=0
```

If you are using the community provided package repository, change the base url to `http://cloudstack.apt-get.eu/rhel/4.3/`

If you’re using your own package repository, change this line to read as appropriate for your 4.3 repository.

(b) Now that you have the repository configured, it’s time to install the `cloudstack-management` package by upgrading the older `cloudstack-management` package.

```
$ sudo yum upgrade cloudstack-management
```

(c) Now it’s time to restart the management server

```
$ sudo service cloudstack-management start
```

(d) For KVM hosts, upgrade the `cloudstack-agent` package

```
$ sudo yum upgrade cloudstack-agent
```

(e) Verify that the file `/etc/cloudstack/agent/environment.properties` has a line that reads:

```
paths.script=/usr/share/cloudstack-common
```

If not, add the line.

(f) Restart the agent:

```
$ sudo service cloudstack-agent stop
$ sudo killall jsvc
$ sudo service cloudstack-agent start
```

12. Now it’s time to restart the management server

```
$ sudo service cloudstack-management start
```

13. Once you’ve upgraded the packages on your management servers, you’ll need to restart the system VMs. Ensure that the admin port is set to 8096 by using the “integration.api.port” global parameter. This port is used by the
cloud-sysvmadm script at the end of the upgrade procedure. For information about how to set this parameter, see “Setting Global Configuration Parameters” in the Installation Guide. Changing this parameter will require management server restart. Also make sure port 8096 is open in your local host firewall to do this.

There is a script that will do this for you, all you need to do is run the script and supply the IP address for your MySQL instance and your MySQL credentials:

```
# nohup cloudstack-sysvmadm -d IP address -u cloud -p -a > sysvm.log 2>&1 &
```

You can monitor the log for progress. The process of restarting the system VMs can take an hour or more.

```
# tail -f sysvm.log
```

The output to `sysvm.log` will look something like this:

```
Stopping and starting 1 secondary storage vm(s)...
Done stopping and starting secondary storage vm(s)
Stopping and starting 1 console proxy vm(s)...
Done stopping and starting console proxy vm(s).
Stopping and starting 4 running routing vm(s)...
Done restarting router(s).
```

**Note:** For Xen Hosts: Copy vhd-utils: This step is only for CloudStack installs that are using Xen hosts.

Copy the file `vhd-utils` to `/usr/share/cloudstack-common/scripts/vm/hypervisor/xenserver`.

### 3.3 Upgrade from 4.1.x to 4.3

This section will guide you from CloudStack 4.1.x versions to CloudStack 4.3.

Any steps that are hypervisor-specific will be called out with a note.

We recommend reading through this section once or twice before beginning your upgrade procedure, and working through it on a test system before working on a production system.

1. Most users of CloudStack manage the installation and upgrades of CloudStack with one of Linux’s predominant package systems, RPM or APT. This guide assumes you’ll be using RPM and Yum (for Red Hat Enterprise Linux or CentOS), or APT and Debian packages (for Ubuntu).

2. **Note:** The following upgrade instructions should be performed regardless of hypervisor type.

   (a) While running the existing 4.1.x system, log in to the UI as root administrator.
   (b) In the left navigation bar, click Templates.
   (c) In Select view, click Templates.
   (d) Click Register template.

      The Register template dialog box is displayed.

   (e) In the Register template dialog box, specify the following values (do not change these):
<table>
<thead>
<tr>
<th>Hypervisor</th>
<th>Description</th>
</tr>
</thead>
</table>
| XenServer  | Name: systemvm-xenserver-4.3  
Description: systemvm-xenserver-4.3  
Zone: Choose the zone where this hypervisor is used  
Hypervisor: XenServer  
Format: VHD  
OS Type: Debian GNU/Linux 7.0 (64-bit) (or the highest Debian release number available in the dropdown)  
Extractable: no  
Password Enabled: no  
Public: no  
Featured: no |
| KVM        | Name: systemvm-kvm-4.3  
Description: systemvm-kvm-4.3  
Zone: Choose the zone where this hypervisor is used  
Hypervisor: KVM  
Format: QCOW2  
OS Type: Debian GNU/Linux 7.0 (64-bit) (or the highest Debian release number available in the dropdown)  
Extractable: no  
Password Enabled: no  
Public: no  
Featured: no |
| VMware     | Name: systemvm-vmware-4.3  
Description: systemvm-vmware-4.3  
Zone: Choose the zone where this hypervisor is used  
Hypervisor: VMware  
Format: OVA  
OS Type: Debian GNU/Linux 7.0 (64-bit) (or the highest Debian release number available in the dropdown)  
Extractable: no  
Password Enabled: no  
Public: no  
Featured: no |

3. Create RPM or Debian packages (as appropriate) and a repository from the 4.3 source, or check the Apache CloudStack downloads page at http://cloudstack.apache.org/downloads.html for package repositories supplied by community members. You will need them for step 8 or step 11.

Instructions for creating packages from the CloudStack source are in the Installation Guide.

4. Stop your management server or servers. Run this on all management server hosts:

```bash
# service cloudstack-management stop
```

5. If you are running a usage server or usage servers, stop those as well:
6. Make a backup of your MySQL database. If you run into any issues or need to roll back the upgrade, this will assist in debugging or restoring your existing environment. You’ll be prompted for your password.

   # mysqldump -u root -p cloud > cloudstack-backup.sql

7. (KVM Only) If primary storage of type local storage is in use, the path for this storage needs to be verified to ensure it passes new validation. Check local storage by querying the cloud.storage_pool table:

   # mysql -u cloud -p -e "select id,name,path from cloud.storage_pool where pool_type='Filesystem'"

   If local storage paths are found to have a trailing forward slash, remove it:

   # mysql -u cloud -p -e 'update cloud.storage_pool set path="/var/lib/libvirt/images" where path="/var/lib/libvirt/images/"';

8. If you are using Ubuntu, follow this procedure to upgrade your packages. If not, skip to step 11.

   **Note:** **Community Packages:** This section assumes you’re using the community supplied packages for CloudStack. If you’ve created your own packages and APT repository, substitute your own URL for the ones used in these examples.

   (a) The first order of business will be to change the sources list for each system with CloudStack packages. This means all management servers, and any hosts that have the KVM agent. (No changes should be necessary for hosts that are running VMware or Xen.)

   Start by opening `/etc/apt/sources.list.d/cloudstack.list` on any systems that have CloudStack packages installed.

   This file should have one line, which contains:

   deb http://cloudstack.apt-get.eu/ubuntu precise 4.1

   We’ll change it to point to the new package repository:

   deb http://cloudstack.apt-get.eu/ubuntu precise 4.3

   If you’re using your own package repository, change this line to read as appropriate for your 4.3 repository.

   (b) Now update your apt package list:

   $ sudo apt-get update

   (c) Now that you have the repository configured, it’s time to install the `cloudstack-management` package. This will pull in any other dependencies you need.

   $ sudo apt-get install cloudstack-management

   (d) You will need to manually install the `cloudstack-agent` package:

   $ sudo apt-get install cloudstack-agent

   During the installation of `cloudstack-agent`, APT will copy your `agent.properties`, `log4j-cloud.xml`, and `environment.properties` from `/etc/cloud/agent` to `/etc/cloudstack/agent`.

   When prompted whether you wish to keep your configuration, say Yes.

   (e) Verify that the file `/etc/cloudstack/agent/environment.properties` has a line that reads:
paths.script=/usr/share/cloudstack-common

If not, add the line.

(f) Restart the agent:

```bash
service cloudstack-agent stop
killall jsvc
service cloudstack-agent start
```

9. (VMware only) Additional steps are required for each VMware cluster. These steps will not affect running
guests in the cloud. These steps are required only for clouds using VMware clusters:

(a) Stop the Management Server:

```bash
service cloudstack-management stop
```

(b) Generate the encrypted equivalent of your vCenter password:

```bash
java -classpath /usr/share/cloudstack-common/lib/jasypt-1.9.0.jar org.jasypt.intf.cli.JasyptPBEStringEncryptionCLI encrypt.sh input="_your_vCenter_password_" password='"cat /etc/cloudstack/management/key"' verbose=false
```

Store the output from this step, we need to add this in cluster_details table and vmware_data_center tables in place of the plain text password

(c) Find the ID of the row of cluster_details table that you have to update:

```bash
mysql -u <username> -p<password>

```

```sql
select * from cloud.cluster_details;
```

(d) Update the plain text password with the encrypted one

```sql
update cloud.cluster_details set value = '_ciphertext_from_step_1_' where id = _id_from_step_2_; 
```

(e) Confirm that the table is updated:

```sql
select * from cloud.cluster_details;
```

(f) Find the ID of the correct row of vmware_data_center that you want to update

```sql
select * from cloud.vmware_data_center;
```

(g) update the plain text password with the encrypted one:

```sql
update cloud.vmware_data_center set password = '_ciphertext_from_step_1_' where id = _id_from_step_5_; 
```

(h) Confirm that the table is updated:

```sql
select * from cloud.vmware_data_center;
```

(i) Start the CloudStack Management server

```bash
service cloudstack-management start
```

10. (KVM only) Additional steps are required for each KVM host. These steps will not affect running
guests in the cloud. These steps are required only for clouds using KVM as hosts and only on the KVM hosts.

(a) Configure the CloudStack yum repository as detailed above.

(b) Stop the running agent.

```bash
# service cloud-agent stop
```
(c) Update the agent software.

    # yum update cloudstack-agent

(d) Start the agent.

    # service cloudstack-agent start

11. If you are using CentOS or RHEL, follow this procedure to upgrade your packages. If not, skip to step 13.

   **Note: Community Packages:** This section assumes you’re using the community supplied packages for CloudStack. If you’ve created your own packages and yum repository, substitute your own URL for the ones used in these examples.

(a) The first order of business will be to change the yum repository for each system with CloudStack packages. This means all management servers, and any hosts that have the KVM agent.

   (No changes should be necessary for hosts that are running VMware or Xen.)

   Start by opening `/etc/yum.repos.d/cloudstack.repo` on any systems that have CloudStack packages installed.

   This file should have content similar to the following:

   ```
   [apache-cloudstack]
   name=Apache CloudStack
   baseurl=http://cloudstack.apt-get.eu/rhel/4.1/
   enabled=1
   gpgcheck=0
   ```

   If you are using the community provided package repository, change the base url to http://cloudstack.apt-get.eu/rhel/4.3/

   If you’re using your own package repository, change this line to read as appropriate for your 4.3 repository.

(b) Now that you have the repository configured, it’s time to install the `cloudstack-management` package by upgrading the older `cloudstack-management` package.

   `$ sudo yum upgrade cloudstack-management`

(c) For KVM hosts, you will need to upgrade the `cloud-agent` package, similarly installing the new version as `cloudstack-agent`.

   `$ sudo yum upgrade cloudstack-agent`

(d) Verify that the file `/etc/cloudstack/agent/environment.properties` has a line that reads:

   ```
   paths.script=/usr/share/cloudstack-common
   ```

   If not, add the line.

(e) Restart the agent:

   ```
   service cloudstack-agent stop
   killall jsvc
   service cloudstack-agent start
   ```

12. Now it’s time to restart the management server

    ```
    # service cloudstack-management start
    ```

### 3.3. Upgrade from 4.1.x to 4.3

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13. Once you’ve upgraded the packages on your management servers, you’ll need to restart the system VMs. Ensure that the admin port is set to 8096 by using the “integration.api.port” global parameter. This port is used by the cloud-sysvmadm script at the end of the upgrade procedure. For information about how to set this parameter, see “Setting Global Configuration Parameters” in the Installation Guide. Changing this parameter will require management server restart. Also make sure port 8096 is open in your local host firewall to do this.

There is a script that will do this for you, all you need to do is run the script and supply the IP address for your MySQL instance and your MySQL credentials:

```
# nohup cloudstack-sysvmadm -d IP address -u cloud -p -a > sysvm.log 2>&1 &
```

You can monitor the log for progress. The process of restarting the system VMs can take an hour or more.

```
# tail -f sysvm.log
```

The output to `sysvm.log` will look something like this:

```
Stopping and starting 1 secondary storage vm(s)...
Done stopping and starting secondary storage vm(s)
Stopping and starting 1 console proxy vm(s)...
Done stopping and starting console proxy vm(s).
Stopping and starting 4 running routing vm(s)...
Done restarting router(s).
```

14. **Note:** For Xen Hosts: Copy vhd-utils: This step is only for CloudStack installs that are using Xen hosts.

Copy the file `vhd-utils` to `/usr/share/cloudstack-common/scripts/vm/hypervisor/xenserver`.

### 3.4 Upgrade from 4.0.x to 4.3

This section will guide you from CloudStack 4.0.x versions to CloudStack 4.3.

Any steps that are hypervisor-specific will be called out with a note.

**Warning:** Package Structure Changes: The package structure for CloudStack has changed significantly since the 4.0.x releases. If you’ve compiled your own packages, you’ll notice that the package names and the number of packages has changed. This is *not* a bug. However, this *does* mean that the procedure is not as simple as an `apt-get upgrade` or `yum update`, so please follow this section carefully.

We recommend reading through this section once or twice before beginning your upgrade procedure, and working through it on a test system before working on a production system.

1. Most users of CloudStack manage the installation and upgrades of CloudStack with one of Linux’s predominant package systems, RPM or APT. This guide assumes you’ll be using RPM and Yum (for Red Hat Enterprise Linux or CentOS), or APT and Debian packages (for Ubuntu).

Create RPM or Debian packages (as appropriate) and a repository from the 4.3 source, or check the Apache CloudStack downloads page at [http://cloudstack.apache.org/downloads.html](http://cloudstack.apache.org/downloads.html) for package repositories supplied by community members. You will need them for step 9 or step 10.

Instructions for creating packages from the CloudStack source are in the Installation Guide.

**Note:** The following upgrade instructions should be performed regardless of hypervisor type.

(a) While running the existing 4.0.0 system, log in to the UI as root administrator.

(b) In the left navigation bar, click Templates.
(c) In Select view, click Templates.

(d) Click Register template.

The Register template dialog box is displayed.

(e) In the Register template dialog box, specify the following values (do not change these):

<table>
<thead>
<tr>
<th>Hypervisor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>XenServer</td>
<td>Name: systemvm-xenserver-4.3</td>
</tr>
<tr>
<td></td>
<td>Description: systemvm-xenserver-4.3</td>
</tr>
<tr>
<td></td>
<td>Zone: Choose the zone where this hypervisor is used</td>
</tr>
<tr>
<td></td>
<td>Hypervisor: XenServer</td>
</tr>
<tr>
<td></td>
<td>Format: VHD</td>
</tr>
<tr>
<td></td>
<td>OS Type: Debian GNU/Linux 7.0 (64-bit) (or the highest Debian release number available in the dropdown)</td>
</tr>
<tr>
<td></td>
<td>Extractable: no</td>
</tr>
<tr>
<td></td>
<td>Password Enabled: no</td>
</tr>
<tr>
<td></td>
<td>Public: no</td>
</tr>
<tr>
<td></td>
<td>Featured: no</td>
</tr>
</tbody>
</table>

| KVM        | Name: systemvm-kvm-4.3 |
|            | Description: systemvm-kvm-4.3 |
|            | Zone: Choose the zone where this hypervisor is used |
|            | Hypervisor: KVM |
|            | Format: QCOW2 |
|            | OS Type: Debian GNU/Linux 7.0 (64-bit) (or the highest Debian release number available in the dropdown) |
|            | Extractable: no |
|            | Password Enabled: no |
|            | Public: no |
|            | Featured: no |

| VMware     | Name: systemvm-vmware-4.3 |
|            | Description: systemvm-vmware-4.3 |
|            | Zone: Choose the zone where this hypervisor is used |
|            | Hypervisor: VMware |
|            | Format: OVA |
|            | OS Type: Debian GNU/Linux 7.0 (64-bit) (or the highest Debian release number available in the dropdown) |
|            | Extractable: no |
|            | Password Enabled: no |
|            | Public: no |
|            | Featured: no |

2. Stop your management server or servers. Run this on all management server hosts:

   # service cloud-management stop

3. If you are running a usage server or usage servers, stop those as well:
# service cloud-usage stop

4. Make a backup of your MySQL database. If you run into any issues or need to roll back the upgrade, this will assist in debugging or restoring your existing environment. You’ll be prompted for your password.

   # mysqldump -u root -p cloud > cloudstack-backup.sql

5. Whether you’re upgrading a Red Hat/CentOS based system or Ubuntu based system, you’re going to need to stop the CloudStack management server before proceeding.

   # service cloud-management stop

6. If you have made changes to /etc/cloud/management/components.xml, you’ll need to carry these over manually to the new file, /etc/cloudstack/management/componentContext.xml. This is not done automatically. (If you’re unsure, we recommend making a backup of the original components.xml to be on the safe side.

7. After upgrading to 4.3, API clients are expected to send plain text passwords for login and user creation, instead of MD5 hash. In case, api client changes are not acceptable, following changes are to be made for backward compatibility:

   Modify componentContext.xml, and make PlainTextUserAuthenticator as the default authenticator (1st entry in the userAuthenticators adapter list is default)

   <!-- Security adapters -->
   <bean id="userAuthenticators" class="com.cloud.utils.component.AdapterList">
      <property name="Adapters">
         <list>
            <ref bean="PlainTextUserAuthenticator"/>
            <ref bean="MD5UserAuthenticator"/>
            <ref bean="LDAPUserAuthenticator"/>
         </list>
      </property>
   </bean>

   PlainTextUserAuthenticator works the same way MD5UserAuthenticator worked prior to 4.3.

8. If you are using Ubuntu, follow this procedure to upgrade your packages. If not, skip to step 10.

   Note: Community Packages: This section assumes you’re using the community supplied packages for CloudStack. If you’ve created your own packages and APT repository, substitute your own URL for the ones used in these examples.

   (a) The first order of business will be to change the sources list for each system with CloudStack packages. This means all management servers, and any hosts that have the KVM agent. (No changes should be necessary for hosts that are running VMware or Xen.)

   Start by opening /etc/apt/sources.list.d/cloudstack.list on any systems that have CloudStack packages installed.

   This file should have one line, which contains:

   deb http://cloudstack.apt-get.eu/ubuntu precise 4.0

   We’ll change it to point to the new package repository:

   deb http://cloudstack.apt-get.eu/ubuntu precise 4.3

   If you’re using your own package repository, change this line to read as appropriate for your 4.3 repository.
(b) Now update your apt package list:

$ sudo apt-get update

(c) Now that you have the repository configured, it’s time to install the `cloudstack-management` package. This will pull in any other dependencies you need.

$ sudo apt-get install cloudstack-management

(d) You will need to manually install the `cloudstack-agent` package:

$ sudo apt-get install cloudstack-agent

During the installation of `cloudstack-agent`, APT will copy your `agent.properties`, `log4j-cloud.xml`, and `environment.properties` from `/etc/cloud/agent` to `/etc/cloudstack/agent`.

When prompted whether you wish to keep your configuration, say Yes.

(e) Verify that the file `/etc/cloudstack/agent/environment.properties` has a line that reads:

paths.script=/usr/share/cloudstack-common

If not, add the line.

(f) Restart the agent:

```
service cloud-agent stop
kills jsvc
service cloudstack-agent start
```

(g) During the upgrade, `log4j-cloud.xml` was simply copied over, so the logs will continue to be added to `/var/log/cloud/agent/agent.log`. There’s nothing wrong with this, but if you prefer to be consistent, you can change this by copying over the sample configuration file:

```
cd /etc/cloudstack/agent
mv log4j-cloud.xml.dpkg-dist log4j-cloud.xml
service cloudstack-agent restart
```

(h) Once the agent is running, you can uninstall the old cloud-* packages from your system:

$ sudo dpkg --purge cloud-agent

9. If you are using CentOS or RHEL, follow this procedure to upgrade your packages. If not, skip to step 11.

**Note:** Community Packages: This section assumes you’re using the community supplied packages for CloudStack. If you’ve created your own packages and yum repository, substitute your own URL for the ones used in these examples.

(a) The first order of business will be to change the yum repository for each system with CloudStack packages. This means all management servers, and any hosts that have the KVM agent. (No changes should be necessary for hosts that are running VMware or Xen.)

Start by opening `/etc/yum.repos.d/cloudstack.repo` on any systems that have CloudStack packages installed.

This file should have content similar to the following:

```
[apache-cloudstack]
name=Apache CloudStack
baseurl=http://cloudstack.apt-get.eu/rhel/4.0/
```
enabled=1
gpgcheck=0

If you are using the community provided package repository, change the baseurl to http://cloudstack.apt-get.eu/rhel/4.3/

If you’re using your own package repository, change this line to read as appropriate for your 4.3 repository.

(b) Now that you have the repository configured, it’s time to install the cloudstack-management package by upgrading the older cloud-client package.

$ sudo yum upgrade cloud-client

(c) For KVM hosts, you will need to upgrade the cloud-agent package, similarly installing the new version as cloudstack-agent.

$ sudo yum upgrade cloud-agent

During the installation of cloudstack-agent, the RPM will copy your agent.properties, log4j-cloud.xml, and environment.properties from /etc/cloud/agent to /etc/cloudstack/agent.

(d) Verify that the file /etc/cloudstack/agent/environment.properties has a line that reads:

paths.script=/usr/share/cloudstack-common

If not, add the line.

(e) Restart the agent:

    service cloud-agent stop
    killall jsvc
    service cloudstack-agent start

10. Once you’ve upgraded the packages on your management servers, you’ll need to restart the system VMs. Make sure port 8096 is open in your local host firewall to do this.

There is a script that will do this for you, all you need to do is run the script and supply the IP address for your MySQL instance and your MySQL credentials:

    # nohup cloudstack-sysvmadm -d IP address -u cloud -p -a > sysvm.log 2>&1 &

You can monitor the log for progress. The process of restarting the system VMs can take an hour or more.

    # tail -f sysvm.log

The output to sysvm.log will look something like this:

Stopping and starting 1 secondary storage vm(s)...
Done stopping and starting secondary storage vm(s)
Stopping and starting 1 console proxy vm(s)...
Done stopping and starting console proxy vm(s).
Stopping and starting 4 running routing vm(s)...
Done restarting router(s).

11. Note: For Xen Hosts: Copy vhd-utils:* This step is only for CloudStack installs that are using Xen hosts.

Copy the file vhd-utils to /usr/share/cloudstack-common/scripts/vm/hypervisor/xenserver.
3.5 Upgrade from 3.0.x to 4.3

This section will guide you from Citrix CloudStack 3.0.x to Apache CloudStack 4.3. Sections that are hypervisor-specific will be called out with a note.

**Note:** The following upgrade instructions should be performed regardless of hypervisor type.

1. While running the existing 3.0.x system, log in to the UI as root administrator.
2. In the left navigation bar, click Templates.
3. In Select view, click Templates.
4. Click Register template.
   The Register template dialog box is displayed.
5. In the Register template dialog box, specify the following values (do not change these):
### Hypervisor

<table>
<thead>
<tr>
<th>Hypervisor</th>
<th>Description</th>
</tr>
</thead>
</table>
| XenServer  | Name: systemvm-xenserver-4.3  
            | Description: systemvm-xenserver-4.3  
            | Zone: Choose the zone where this hypervisor is used  
            | Hypervisor: XenServer  
            | Format: VHD  
            | OS Type: Debian GNU/Linux 7.0 (64-bit) (or the highest Debian release number available in the dropdown)  
            | Extractable: no  
            | Password Enabled: no  
            | Public: no  
            | Featured: no |
| KVM        | Name: systemvm-kvm-4.3  
            | Description: systemvm-kvm-4.3  
            | Zone: Choose the zone where this hypervisor is used  
            | Hypervisor: KVM  
            | Format: QCOW2  
            | OS Type: Debian GNU/Linux 7.0 (64-bit) (or the highest Debian release number available in the dropdown)  
            | Extractable: no  
            | Password Enabled: no  
            | Public: no  
            | Featured: no |
| VMware     | Name: systemvm-vmware-4.3  
            | Description: systemvm-vmware-4.3  
            | Zone: Choose the zone where this hypervisor is used  
            | Hypervisor: VMware  
            | Format: OVA  
            | OS Type: Debian GNU/Linux 7.0 (64-bit) (or the highest Debian release number available in the dropdown)  
            | Extractable: no  
            | Password Enabled: no  
            | Public: no  
            | Featured: no |

6. Watch the screen to be sure that the template downloads successfully and enters the READY state. Do not proceed until this is successful.

1. (KVM on RHEL 6.0/6.1 only) If your existing CloudStack deployment includes one or more clusters of KVM hosts running RHEL 6.0 or RHEL 6.1, perform the following:
   
   (a) Ensure that you upgrade the operating system version on those hosts before upgrading CloudStack

   To do that, change the yum repository for each system with CloudStack packages, that implies that all the Management Servers and any hosts that have the KVM agent.

   (b) Open `/etc/yum.repos.d/cloudstack.repo` on any systems that have CloudStack packages installed.
(c) Edit as follows:

```bash
[upgrade]
name=rhel63
baseurl=url-of-your-rhel6.3-repo
enabled=1
gpgcheck=0

[apache CloudStack]
name=Apache CloudStack
baseurl=http://cloudstack.apt-get.eu/rhel/4.3/
enabled=1
gpgcheck=0
```

If you are using the community provided package repository, change the baseurl to `http://cloudstack.apt-get.eu/rhel/4.3/`

If you are using your own package repository, change this line to read as appropriate for your 4.3 repository.

(d) Now that you have the repository configured, upgrade the host operating system from RHEL 6.0 to 6.3:

```bash
# yum upgrade
```

2. Stop all Usage Servers if running. Run this on all Usage Server hosts.

```bash
# service cloud-usage stop
```

3. Stop the Management Servers. Run this on all Management Server hosts.

```bash
# service cloud-management stop
```

4. On the MySQL master, take a backup of the MySQL databases. We recommend performing this step even in test upgrades. If there is an issue, this will assist with debugging.

In the following commands, it is assumed that you have set the root password on the database, which is a CloudStack recommended best practice. Substitute your own MySQL root password.

```bash
# mysqldump -u root -p mysql_password cloud > cloud-backup.dmp
# mysqldump -u root -p mysql_password cloud_usage > cloud-usage-backup.dmp
```

5. Either build RPM/DEB packages as detailed in the Installation Guide, or use one of the community provided yum/apt repositories to gain access to the CloudStack binaries.

6. If you are using Ubuntu, follow this procedure to upgrade your packages. If not, skip to step 8.

**Note: Community Packages:** This section assumes you’re using the community supplied packages for CloudStack. If you’ve created your own packages and APT repository, substitute your own URL for the ones used in these examples.

(a) The first order of business will be to change the sources list for each system with CloudStack packages. This means all management servers, and any hosts that have the KVM agent. (No changes should be necessary for hosts that are running VMware or Xen.)

Start by opening `/etc/apt/sources.list.d/cloudstack.list` on any systems that have CloudStack packages installed.

This file should have one line, which contains:

```text
deb http://cloudstack.apt-get.eu/ubuntu precise 4.0
```

We’ll change it to point to the new package repository:
deb http://cloudstack.apt-get.eu/ubuntu precise 4.3

If you’re using your own package repository, change this line to read as appropriate for your 4.3 repository.

(b) Now update your apt package list:

```
sudo apt-get update
```

(c) Now that you have the repository configured, it’s time to install the cloudstack-management package. This will pull in any other dependencies you need.

```
sudo apt-get install cloudstack-management
```

(d) You will need to manually install the cloudstack-agent package:

```
sudo apt-get install cloudstack-agent
```

During the installation of cloudstack-agent, APT will copy your agent.properties, log4j-cloud.xml, and environment.properties from /etc/cloud/agent to /etc/cloudstack/agent.

When prompted whether you wish to keep your configuration, say Yes.

(e) Verify that the file /etc/cloudstack/agent/environment.properties has a line that reads:

```
paths.script=/usr/share/cloudstack-common
```

If not, add the line.

(f) Restart the agent:

```
service cloud-agent stop
killall jsvc
service cloudstack-agent start
```

(g) During the upgrade, log4j-cloud.xml was simply copied over, so the logs will continue to be added to /var/log/cloud/agent/agent.log. There’s nothing wrong with this, but if you prefer to be consistent, you can change this by copying over the sample configuration file:

```
cd /etc/cloudstack/agent
mv log4j-cloud.xml.dpkg-dist log4j-cloud.xml
service cloudstack-agent restart
```

(h) Once the agent is running, you can uninstall the old cloud-* packages from your system:

```
sudo dpkg --purge cloud-agent
```

7. If you are using CentOS or RHEL, follow this procedure to upgrade your packages. If not, skip to step 9.

**Note: Community Packages:** This section assumes you’re using the community supplied packages for CloudStack. If you’ve created your own packages and yum repository, substitute your own URL for the ones used in these examples.

(a) The first order of business will be to change the yum repository for each system with CloudStack packages. This means all management servers, and any hosts that have the KVM agent. (No changes should be necessary for hosts that are running VMware or Xen.)

Start by opening /etc/yum.repos.d/cloudstack.repo on any systems that have CloudStack packages installed.

This file should have content similar to the following:
[apache-cloudstack]
name=Apache CloudStack
baseurl=http://cloudstack.apt-get.eu/rhel/4.3/
enabled=1
gpgcheck=0

If you are using the community provided package repository, change the baseurl to http://cloudstack.apt-get.eu/rhel/4.3/

If you’re using your own package repository, change this line to read as appropriate for your 4.3 repository.

(b) Now that you have the repository configured, it’s time to install the cloudstack-management package by upgrading the older cloud-client package.

$ sudo yum upgrade cloud-client

c) For KVM hosts, you will need to upgrade the cloud-agent package, similarly installing the new version as cloudstack-agent.

$ sudo yum upgrade cloud-agent

During the installation of cloudstack-agent, the RPM will copy your agent.properties, log4j-cloud.xml, and environment.properties from /etc/cloud/agent to /etc/cloudstack/agent.

d) Verify that the file /etc/cloudstack/agent/environment.properties has a line that reads:

    paths.script=/usr/share/cloudstack-common

    If not, add the line.

e) Restart the agent:

    service cloud-agent stop
    killall jsvc
    service cloudstack-agent start

8. If you have made changes to your copy of /etc/cloud/management/components.xml the changes will be preserved in the upgrade. However, you need to do the following steps to place these changes in a new version of the file which is compatible with version 4.2.x.

(a) Make a backup copy of /etc/cloud/management/components.xml. For example:

    # mv /etc/cloud/management/components.xml /etc/cloud/management/components.xml-backup

(b) Copy /etc/cloud/management/components.xml.rpmnew to create a new /etc/cloud/management/components.xml:

    # cp -ap /etc/cloud/management/components.xml.rpmnew /etc/cloud/management/components.xml

(c) Merge your changes from the backup file into the new components.xml.

    # vi /etc/cloudstack/management/components.xml

Note: If you have more than one management server node, repeat the upgrade steps on each node.

9. After upgrading to 4.3, API clients are expected to send plain text passwords for login and user creation, instead of MD5 hash. Incase, api client changes are not acceptable, following changes are to be made for backward compatibility:

3.5. Upgrade from 3.0.x to 4.3
Modify componentContext.xml, and make PlainTextUserAuthenticator as the default authenticator (1st entry in the userAuthenticators adapter list is default)

```xml
<!-- Security adapters -->
<bean id="userAuthenticators" class="com.cloud.utils.component.AdapterList">
    <property name="Adapters">
        <list>
            <ref bean="PlainTextUserAuthenticator"/>
            <ref bean="MD5UserAuthenticator"/>
            <ref bean="LDAPUserAuthenticator"/>
        </list>
    </property>
</bean>
```

PlainTextUserAuthenticator works the same way MD5UserAuthenticator worked prior to 4.3

10. Start the first Management Server. Do not start any other Management Server nodes yet.

```bash
# service cloudstack-management start
```

Wait until the databases are upgraded. Ensure that the database upgrade is complete. After confirmation, start the other Management Servers one at a time by running the same command on each node.

**Note:** Failing to restart the Management Server indicates a problem in the upgrade. Having the Management Server restarted without any issues indicates that the upgrade is successfully completed.

11. Start all Usage Servers (if they were running on your previous version). Perform this on each Usage Server host.

```bash
# service cloudstack-usage start
```

12. Additional steps are required for each KVM host. These steps will not affect running guests in the cloud. These steps are required only for clouds using KVM as hosts and only on the KVM hosts.

(a) Configure a yum or apt repository containing the CloudStack packages as outlined in the Installation Guide.

(b) Stop the running agent.

```bash
# service cloud-agent stop
```

(c) Update the agent software with one of the following command sets as appropriate for your environment.

```bash
# yum update cloud-*
# apt-get update
# apt-get upgrade cloud-*
```


(e) Upgrade all the existing bridge names to new bridge names by running this script:

```bash
# cloudstack-agent-upgrade
```

(f) Install a libvirt hook with the following commands:

```bash
# mkdir /etc/libvirt/hooks
# cp /usr/share/cloudstack-agent/lib/libvirtqemuhook /etc/libvirt/hooks/qemu
# chmod +x /etc/libvirt/hooks/qemu
```

(g) Restart libvirtd.
# service libvirtd restart

(h) Start the agent.

# service cloudstack-agent start

(i) When the Management Server is up and running, log in to the CloudStack UI and restart the virtual router for proper functioning of all the features.

13. Log in to the CloudStack UI as administrator, and check the status of the hosts. All hosts should come to Up state (except those that you know to be offline). You may need to wait 20 or 30 minutes, depending on the number of hosts.

**Note:** Troubleshooting: If login fails, clear your browser cache and reload the page.

Do not proceed to the next step until the hosts show in Up state.

14. If you are upgrading from 3.0.x, perform the following:

(a) Ensure that the admin port is set to 8096 by using the “integration.api.port” global parameter.

This port is used by the cloud-sysvmadm script at the end of the upgrade procedure. For information about how to set this parameter, see “Setting Global Configuration Parameters” in the Installation Guide.

(b) Restart the Management Server.

**Note:** If you don’t want the admin port to remain open, you can set it to null after the upgrade is done and restart the management server.

15. Run the `cloudstack-sysvmadm` script to stop, then start, all Secondary Storage VMs, Console Proxy VMs, and virtual routers. Run the script once on each management server. Substitute your own IP address of the MySQL instance, the MySQL user to connect as, and the password to use for that user. In addition to those parameters, provide the `-c` and `-r` arguments. For example:

```bash
# nohup cloudstack-sysvmadm -d 192.168.1.5 -u cloud -p password -c -r > sysvm.log 2>&1 &
# tail -f sysvm.log
```

This might take up to an hour or more to run, depending on the number of accounts in the system.

16. If needed, upgrade all Citrix XenServer hypervisor hosts in your cloud to a version supported by CloudStack 4.3. The supported versions are XenServer 5.6 SP2 and 6.0.2. Instructions for upgrade can be found in the CloudStack 4.3 Installation Guide under “Upgrading XenServer Versions.”

17. Now apply the XenServer hotfix XS602E003 (and any other needed hotfixes) to XenServer v6.0.2 hypervisor hosts.

(a) Disconnect the XenServer cluster from CloudStack.

In the left navigation bar of the CloudStack UI, select Infrastructure. Under Clusters, click View All. Select the XenServer cluster and click Actions - Unmanage.

This may fail if there are hosts not in one of the states Up, Down, Disconnected, or Alert. You may need to fix that before unmanaging this cluster.

Wait until the status of the cluster has reached Unmanaged. Use the CloudStack UI to check on the status. When the cluster is in the unmanaged state, there is no connection to the hosts in the cluster.

(b) To clean up the VLAN, log in to one XenServer host and run:

```
/opt/xensource/bin/cloud-clean-vlan.sh
```
(c) Now prepare the upgrade by running the following on one XenServer host:

```
/opt/xensource/bin/cloud-prepare-upgrade.sh
```

If you see a message like “can’t eject CD”, log in to the VM and unmount the CD, then run this script again.

(d) Upload the hotfix to the XenServer hosts. Always start with the Xen pool master, then the slaves. Using your favorite file copy utility (e.g. WinSCP), copy the hotfixes to the host. Place them in a temporary folder such as /tmp.

On the Xen pool master, upload the hotfix with this command:

```
xe patch-upload file-name=XS602E003.xsupdate
```

Make a note of the output from this command, which is a UUID for the hotfix file. You’ll need it in another step later.

**Note:** (Optional) If you are applying other hotfixes as well, you can repeat the commands in this section with the appropriate hotfix number. For example, XS602E004.xsupdate.

(e) Manually live migrate all VMs on this host to another host. First, get a list of the VMs on this host:

```
# xe vm-list
```

Then use this command to migrate each VM. Replace the example host name and VM name with your own:

```
# xe vm-migrate live=true host=host-name vm=‘VM-name’
```

**Note:** **Troubleshooting:** If you see a message like “You attempted an operation on a VM which requires PV drivers to be installed but the drivers were not detected,” run:

```
/opt/xensource/bin/make_migratable.sh b6cf79c8-02ee-050b-922f-49583d9f1a14.
```

(f) Apply the hotfix. First, get the UUID of this host:

```
# xe host-list
```

Then use the following command to apply the hotfix. Replace the example host UUID with the current host ID, and replace the hotfix UUID with the output from the patch-upload command you ran on this machine earlier. You can also get the hotfix UUID by running xe patch-list.

```
xe patch-apply host-uuid=host-uuid uuid=hotfix-uuid
```

(g) Copy the following files from the CloudStack Management Server to the host.

<table>
<thead>
<tr>
<th>Copy from here...</th>
<th>...to here</th>
</tr>
</thead>
<tbody>
<tr>
<td>/usr/lib64/cloud/common /scripts/vm/hypervisor/xenserver/xenserver60/N FSSR.py</td>
<td>/opt/xensource/sm/NFSSR.py</td>
</tr>
<tr>
<td>/usr/lib64/cloud/common /scripts/vm/hypervisor/xenserver/setupxenserver r.sh</td>
<td>/opt/xensource/bin/setupxenserver.sh</td>
</tr>
<tr>
<td>/usr/lib64/cloud/common /scripts/vm/hypervisor/xenserver/make_migratable.sh</td>
<td>/opt/xensource/bin/make_migratable.sh</td>
</tr>
</tbody>
</table>

(h) (Only for hotfixes XS602E005 and XS602E007) You need to apply a new Cloud Support Pack.

- Download the CSP software onto the XenServer host from one of the following links:


- Extract the file:

  # tar xf xenserver-cloud-supp.tgz

- Run the following script:

  # xe-install-supplemental-pack xenserver-cloud-supp.iso

- If the XenServer host is part of a zone that uses basic networking, disable Open vSwitch (OVS):

  # xe-switch-network-backend bridge

(i) Reboot this XenServer host.

(j) Run the following:

  /opt/xensource/bin/setupxenserver.sh

Note: If the message “mv: cannot stat '/etc/cron.daily/logrotate': No such file or directory” appears, you can safely ignore it.

(k) Run the following:

  for pbd in `xe pbd-list currently-attached=false| grep ^uuid | awk '{print $NF}'`; do xe pbd-plug uuid=$pbd;

(l) On each slave host in the Xen pool, repeat these steps, starting from “manually live migrate VMs.”

Note: Troubleshooting Tip: If passwords which you know to be valid appear not to work after upgrade, or other UI issues are seen, try clearing your browser cache and reloading the UI page.

3.6 Upgrade from 2.2.14 to 4.3

1. Ensure that you query your IP address usage records and process them; for example, issue invoices for any usage that you have not yet billed users for.

   Starting in 3.0.2, the usage record format for IP addresses is the same as the rest of the usage types. Instead of a single record with the assignment and release dates, separate records are generated per aggregation period with start and end dates. After upgrading to 4.3, any existing IP address usage records in the old format will no longer be available.

2. If you are using version 2.2.0 - 2.2.13, first upgrade to 2.2.14 by using the instructions in the 2.2.14 Release Notes.

   Warning: KVM Hosts: If KVM hypervisor is used in your cloud, be sure you completed the step to insert a valid username and password into the host_details table on each KVM node as described in the 2.2.14 Release Notes. This step is critical, as the database will be encrypted after the upgrade to 4.3.

3. While running the 2.2.14 system, log in to the UI as root administrator.

4. Using the UI, add a new System VM template for each hypervisor type that is used in your cloud. In each zone, add a system VM template for each hypervisor used in that zone.
(a) In the left navigation bar, click Templates.

(b) In Select view, click Templates.

(c) Click Register template.

The Register template dialog box is displayed.

(d) In the Register template dialog box, specify the following values depending on the hypervisor type (do not change these):

<table>
<thead>
<tr>
<th>Hypervisor</th>
<th>Description</th>
</tr>
</thead>
</table>
| XenServer  | Name: systemvm-xenserver-4.3  
Description: systemvm-xenserver-4.3  
Zone: Choose the zone where this hypervisor is used  
Hypervisor: XenServer  
Format: VHD  
OS Type: Debian GNU/Linux 7.0 (64-bit) (or the highest Debian release number available in the dropdown)  
Extractable: no  
Password Enabled: no  
Public: no  
Featured: no |
| KVM        | Name: systemvm-kvm-4.3  
Description: systemvm-kvm-4.3  
Zone: Choose the zone where this hypervisor is used  
Hypervisor: KVM  
Format: QCOW2  
OS Type: Debian GNU/Linux 7.0 (64-bit) (or the highest Debian release number available in the dropdown)  
Extractable: no  
Password Enabled: no  
Public: no  
Featured: no |
| VMware     | Name: systemvm-vmware-4.3  
Description: systemvm-vmware-4.3  
Zone: Choose the zone where this hypervisor is used  
Hypervisor: VMware  
Format: OVA  
OS Type: Debian GNU/Linux 7.0 (64-bit) (or the highest Debian release number available in the dropdown)  
Extractable: no  
Password Enabled: no  
Public: no  
Featured: no |

5. Watch the screen to be sure that the template downloads successfully and enters the READY state. Do not proceed until this is successful.
6. **WARNING**: If you use more than one type of hypervisor in your cloud, be sure you have repeated these steps to download the system VM template for each hypervisor type. Otherwise, the upgrade will fail.

7. (KVM on RHEL 6.0/6.1 only) If your existing CloudStack deployment includes one or more clusters of KVM hosts running RHEL 6.0 or RHEL 6.1, perform the following:
   
   (a) Ensure that you upgrade the operating system version on those hosts before upgrading CloudStack
   
   To do that, change the yum repository for each system with CloudStack packages, that implies that all the Management Servers and any hosts that have the KVM agent.
   
   (b) Open `/etc/yum.repos.d/cloudstack.repo` on any systems that have CloudStack packages installed.
   
   (c) Edit as follows:

   ```
   [upgrade]
   name=rhel63
   baseurl=url-of-your-rhel6.3-repo
   enabled=1
   gpgcheck=0
   [apache CloudStack]
   name= Apache CloudStack
   baseurl= http://cloudstack.apt-get.eu/rhel/4.2/
   enabled=1
   gpgcheck=0
   
   If you are using the community provided package repository, change the baseurl to http://cloudstack.apt-get.eu/rhel/4.2/
   If you are using your own package repository, change this line to read as appropriate for your 4.2 repository.
   ```
   
   (d) Now that you have the repository configured, upgrade the host operating system from RHEL 6.0 to 6.3:

   ```
   # yum upgrade
   ```

8. Stop all Usage Servers if running. Run this on all Usage Server hosts.

   ```
   # service cloud-usage stop
   ```


   ```
   # service cloud-management stop
   ```

10. On the MySQL master, take a backup of the MySQL databases. We recommend performing this step even in test upgrades. If there is an issue, this will assist with debugging.

    In the following commands, it is assumed that you have set the root password on the database, which is a CloudStack recommended best practice. Substitute your own MySQL root password.

    ```
    # mysqldump -u root -pmysql_password cloud > cloud-backup.dmp
    # mysqldump -u root -pmysql_password cloud_usage > cloud-usage-backup.dmp
    ```

11. Either build RPM/DEB packages as detailed in the Installation Guide, or use one of the community provided yum/apt repositories to gain access to the CloudStack binaries.

12. If you are using Ubuntu, follow this procedure to upgrade your packages. If not, skip to step 13.

    **Note:** **Community Packages:** This section assumes you’re using the community supplied packages for CloudStack. If you’ve created your own packages and APT repository, substitute your own URL for the ones used in these examples.
(a) The first order of business will be to change the sources list for each system with CloudStack packages. This means all management servers, and any hosts that have the KVM agent. (No changes should be necessary for hosts that are running VMware or Xen.)

Start by opening `/etc/apt/sources.list.d/cloudstack.list` on any systems that have CloudStack packages installed.

This file should have one line, which contains:

```
deb http://cloudstack.apt-get.eu/ubuntu precise 4.0
```

We’ll change it to point to the new package repository:

```
deb http://cloudstack.apt-get.eu/ubuntu precise 4.3
```

If you’re using your own package repository, change this line to read as appropriate for your 4.2 repository.

(b) Now update your apt package list:

```
$ sudo apt-get update
```

(c) Now that you have the repository configured, it’s time to install the `cloudstack-management` package. This will pull in any other dependencies you need.

```
$ sudo apt-get install cloudstack-management
```

(d) On KVM hosts, you will need to manually install the `cloudstack-agent` package:

```
$ sudo apt-get install cloudstack-agent
```

During the installation of `cloudstack-agent`, APT will copy your `agent.properties`, `log4j-cloud.xml`, and `environment.properties` from `/etc/cloud/agent` to `/etc/cloudstack/agent`.

When prompted whether you wish to keep your configuration, say Yes.

(e) Verify that the file `/etc/cloudstack/agent/environment.properties` has a line that reads:

```
paths.script=/usr/share/cloudstack-common
```

If not, add the line.

(f) Restart the agent:

```
service cloud-agent stop
killall jsvc
service cloudstack-agent start
```

(g) During the upgrade, `log4j-cloud.xml` was simply copied over, so the logs will continue to be added to `/var/log/cloud/agent/agent.log`. There’s nothing wrong with this, but if you prefer to be consistent, you can change this by copying over the sample configuration file:

```
cd /etc/cloudstack/agent
mv log4j-cloud.xml dpkg-dist log4j-cloud.xml
service cloudstack-agent restart
```

(h) Once the agent is running, you can uninstall the old cloud-* packages from your system:

```
sudo dpkg --purge cloud-agent
```

13. If you are using CentOS or RHEL, follow this procedure to upgrade your packages. If not, skip to step 14.

**Note:** *Community Packages:* This section assumes you’re using the community supplied packages for Cloud-
Stack. If you’ve created your own packages and yum repository, substitute your own URL for the ones used in these examples.

(a) The first order of business will be to change the yum repository for each system with CloudStack packages. This means all management servers, and any hosts that have the KVM agent. (No changes should be necessary for hosts that are running VMware or Xen.)

Start by opening `/etc/yum.repos.d/cloudstack.repo` on any systems that have CloudStack packages installed.

This file should have content similar to the following:

```
[apache-cloudstack]
name=Apache CloudStack
baseurl=http://cloudstack.apt-get.eu/rhel/4.0/
enabled=1
gpgcheck=0
```

If you are using the community provided package repository, change the baseurl to `http://cloudstack.apt-get.eu/rhel/4.2/`

If you’re using your own package repository, change this line to read as appropriate for your 4.3 repository.

(b) Now that you have the repository configured, it’s time to install the `cloudstack-management` package by upgrading the older `cloud-client` package.

$ sudo yum upgrade cloud-client

(c) For KVM hosts, you will need to upgrade the `cloud-agent` package, similarly installing the new version as `cloudstack-agent`.

$ sudo yum upgrade cloud-agent

During the installation of `cloudstack-agent`, the RPM will copy your `agent.properties`, `log4j-cloud.xml`, and `environment.properties` from `/etc/cloud/agent` to `/etc/cloudstack/agent`.

(d) Verify that the file `/etc/cloudstack/agent/environment.properties` has a line that reads:

```
paths.script=/usr/share/cloudstack-common
```

If not, add the line.

(e) Restart the agent:

```
service cloud-agent stop
killall jsvc
service cloudstack-agent start
```

14. If you have made changes to your existing copy of the file `components.xml` in your previous-version CloudStack installation, the changes will be preserved in the upgrade. However, you need to do the following steps to place these changes in a new version of the file which is compatible with version 4.0.0-incubating.

**Note:** How will you know whether you need to do this? If the upgrade output in the previous step included a message like the following, then some custom content was found in your old `components.xml`, and you need to merge the two files:

```
warning: /etc/cloud/management/components.xml created as /etc/cloud/management/components.xml.rpmnew
```
(a) Make a backup copy of your `/etc/cloud/management/components.xml` file. For example:

```
# mv /etc/cloud/management/components.xml /etc/cloud/management/components.xml-backup
```

(b) Copy `/etc/cloud/management/components.xml.rpmnew` to create a new `/etc/cloud/management/components.xml`:

```
# cp -ap /etc/cloud/management/components.xml.rpmnew /etc/cloud/management/components.xml
```

(c) Merge your changes from the backup file into the new `components.xml` file.

```
# vi /etc/cloudstack/management/components.xml
```

15. After upgrading to 4.3, API clients are expected to send plain text passwords for login and user creation, instead of MD5 hash. If API client changes are not acceptable, following changes are to be made for backward compatibility:

Modify `componentContext.xml`, and make `PlainTextUserAuthenticator` as the default authenticator (1st entry in the `userAuthenticators` adapter list is default):

```xml
<bean id="userAuthenticators" class="com.cloud.utils.component.AdapterList">
  <property name="Adapters">
    <list>
      <ref bean="PlainTextUserAuthenticator"/>
      <ref bean="MD5UserAuthenticator"/>
      <ref bean="LDAPUserAuthenticator"/>
    </list>
  </property>
</bean>
```

`PlainTextUserAuthenticator` works the same way `MD5UserAuthenticator` worked prior to 4.2.

16. If you have made changes to your existing copy of the `/etc/cloud/management/db.properties` file in your previous-version CloudStack installation, the changes will be preserved in the upgrade. However, you need to do the following steps to place these changes in a new version of the file which is compatible with this version.

(a) Make a backup copy of your file `/etc/cloud/management/db.properties`. For example:

```
# mv /etc/cloud/management/db.properties /etc/cloud/management/db.properties-backup
```

(b) Copy `/etc/cloud/management/db.properties.rpmnew` to create a new `/etc/cloud/management/db.properties`:

```
# cp -ap /etc/cloud/management/db.properties.rpmnew /etc/cloud/management/db.properties
```

(c) Merge your changes from the backup file into the new `db.properties` file.

```
# vi /etc/cloudstack/management/db.properties
```

17. On the management server node, run the following command. It is recommended that you use the command-line flags to provide your own encryption keys. See Password and Key Encryption in the Installation Guide.

```
# cloudstack-setup-encryption -e encryption_type -m management_server_key -k database_key
```

When used without arguments, as in the following example, the default encryption type and keys will be used:

- (Optional) For `encryption_type`, use `file` or `web` to indicate the technique used to pass in the database encryption password. Default: file.
• (Optional) For management_server_key, substitute the default key that is used to encrypt confidential parameters in the properties file. Default: password. It is highly recommended that you replace this with a more secure value.

• (Optional) For database_key, substitute the default key that is used to encrypt confidential parameters in the CloudStack database. Default: password. It is highly recommended that you replace this with a more secure value.

18. Repeat steps 10 - 14 on every management server node. If you provided your own encryption key in step 14, use the same key on all other management servers.

19. Start the first Management Server. Do not start any other Management Server nodes yet.

   `# service cloudstack-management start`

   Wait until the databases are upgraded. Ensure that the database upgrade is complete. You should see a message like “Complete! Done.” After confirmation, start the other Management Servers one at a time by running the same command on each node.

20. Start all Usage Servers (if they were running on your previous version). Perform this on each Usage Server host.

   `# service cloudstack-usage start`

21. (KVM only) Perform the following additional steps on each KVM host.

   These steps will not affect running guests in the cloud. These steps are required only for clouds using KVM as hosts and only on the KVM hosts.

   (a) Configure your CloudStack package repositories as outlined in the Installation Guide.

   (b) Stop the running agent.

   `# service cloud-agent stop`

   (c) Update the agent software with one of the following command sets as appropriate.

   `# yum update cloud-`

   `# apt-get update`

   `# apt-get upgrade cloud-`

   (d) Copy the contents of the `agent.properties` file to the new `agent.properties` file by using the following command.


   (e) Upgrade all the existing bridge names to new bridge names by running this script.

   `# cloudstack-agent-upgrade`

   (f) Install a libvirt hook with the following commands.

   `# mkdir /etc/libvirt/hooks`

   `# cp /usr/share/cloudstack-agent/lib/libvirtqemuhook /etc/libvirt/hooks/qemu`

   `# chmod +x /etc/libvirt/hooks/qemu`

   (g) Restart libvirtd.

   `# service libvirtd restart`

   (h) Start the agent.
# service cloudstack-agent start

(i) When the Management Server is up and running, log in to the CloudStack UI and restart the virtual router for proper functioning of all the features.

22. Log in to the CloudStack UI as admin, and check the status of the hosts. All hosts should come to Up state (except those that you know to be offline). You may need to wait 20 or 30 minutes, depending on the number of hosts.

Do not proceed to the next step until the hosts show in the Up state. If the hosts do not come to the Up state, contact support.

23. Run the following script to stop, then start, all Secondary Storage VMs, Console Proxy VMs, and virtual routers.

(a) Run the command once on one management server. Substitute your own IP address of the MySQL instance, the MySQL user to connect as, and the password to use for that user. In addition to those parameters, provide the “-c” and “-r” arguments. For example:

```
# nohup cloudstack-sysvmadm -d 192.168.1.5 -u cloud -p password -c -r > sysvm.log 2>&1 &
# tail -f sysvm.log
```

This might take up to an hour or more to run, depending on the number of accounts in the system.

(b) After the script terminates, check the log to verify correct execution:

```
# tail -f sysvm.log
```

The content should be like the following:

```
Stopping and starting 1 secondary storage vm(s)...
Done stopping and starting secondary storage vm(s)
Stopping and starting 1 console proxy vm(s)...
Done stopping and starting console proxy vm(s).
Stopping and starting 4 running routing vm(s)...
Done restarting router(s).
```

24. If you would like additional confirmation that the new system VM templates were correctly applied when these system VMs were rebooted, SSH into the System VM and check the version.

Use one of the following techniques, depending on the hypervisor.

**XenServer or KVM:**

SSH in by using the link local IP address of the system VM. For example, in the command below, substitute your own path to the private key used to log in to the system VM and your own link local IP.

Run the following commands on the XenServer or KVM host on which the system VM is present:

```
# ssh -i private-key-path link-local-ip -p 3922
# cat /etc/cloudstack-release
```

The output should be like the following:

```
Cloudstack Release 4.0.0-incubating Mon Oct 9 15:10:04 PST 2012
```

**ESXi:**

SSH in using the private IP address of the system VM. For example, in the command below, substitute your own path to the private key used to log in to the system VM and your own private IP.

Run the following commands on the Management Server:
# ssh -i private-key-path private-ip -p 3922
# cat /etc/cloudstack-release

The output should be like the following:

Cloudstack Release 4.0.0-incubating Mon Oct 9 15:10:04 PST 2012

25. If needed, upgrade all Citrix XenServer hypervisor hosts in your cloud to a version supported by CloudStack 4.0.0-incubating. The supported versions are XenServer 5.6 SP2 and 6.0.2. Instructions for upgrade can be found in the CloudStack 4.0.0-incubating Installation Guide.

26. Apply the XenServer hotfix XS602E003 (and any other needed hotfixes) to XenServer v6.0.2 hypervisor hosts.
   (a) Disconnect the XenServer cluster from CloudStack.
       In the left navigation bar of the CloudStack UI, select Infrastructure. Under Clusters, click View All. Select the XenServer cluster and click Actions - Unmanage.
       This may fail if there are hosts not in one of the states Up, Down, Disconnected, or Alert. You may need to fix that before unmanaging this cluster.
       Wait until the status of the cluster has reached Unmanaged. Use the CloudStack UI to check on the status. When the cluster is in the unmanaged state, there is no connection to the hosts in the cluster.
   (b) To clean up the VLAN, log in to one XenServer host and run:
       /opt/xensource/bin/cloud-clean-vlan.sh
   (c) Prepare the upgrade by running the following on one XenServer host:
       /opt/xensource/bin/cloud-prepare-upgrade.sh
       If you see a message like “can’t eject CD”, log in to the VM and umount the CD, then run this script again.
   (d) Upload the hotfix to the XenServer hosts. Always start with the Xen pool master, then the slaves. Using your favorite file copy utility (e.g. WinSCP), copy the hotfixes to the host. Place them in a temporary folder such as /root or /tmp.
       On the Xen pool master, upload the hotfix with this command:
       xe patch-upload file-name=XS602E003.xsupdate
       Make a note of the output from this command, which is a UUID for the hotfix file. You’ll need it in another step later.
       Note: (Optional) If you are applying other hotfixes as well, you can repeat the commands in this section with the appropriate hotfix number. For example, XS602E004.xsupdate.
   (e) Manually live migrate all VMs on this host to another host. First, get a list of the VMs on this host:
       # xe vm-list
       Then use this command to migrate each VM. Replace the example host name and VM name with your own:
       # xe vm-migrate live=true host=host-name vm=VM-name
       Note: Troubleshooting: If you see a message like “You attempted an operation on a VM which requires PV drivers to be installed but the drivers were not detected,” run:
       /opt/xensource/bin/make_migratable.sh b6cf79c8-02ee-050b-922f-49583d9f1a14.

3.6. Upgrade from 2.2.14 to 4.3
(f) Apply the hotfix. First, get the UUID of this host:

```bash
# xe host-list
```

Then use the following command to apply the hotfix. Replace the example host UUID with the current host ID, and replace the hotfix UUID with the output from the patch-upload command you ran on this machine earlier. You can also get the hotfix UUID by running xe patch-list.

```bash
xe patch-apply host-uuid=host-uuid uuid="hotfix-uuid"
```

(g) Copy the following files from the CloudStack Management Server to the host.

<table>
<thead>
<tr>
<th>Copy from here...</th>
<th>...to here</th>
</tr>
</thead>
<tbody>
<tr>
<td>/usr/share/cloudstack -common/scripts/vm/hypervisor/xenserver/xenser ver60/NFSSR.py</td>
<td>/opt/xensource/bin/setupxenserver.sh</td>
</tr>
<tr>
<td>/usr/share/cloudstack -common/scripts/vm/hypervisor/xenserver/setupxenserver.sh</td>
<td>/opt/xensource/bin/make_migratable.sh</td>
</tr>
<tr>
<td>/usr/lib64/cloudstack -common/scripts/vm/hypervisor/xenserver/make_migratable.sh</td>
<td>/opt/xensource/bin/make_migratable.sh</td>
</tr>
</tbody>
</table>

(h) (Only for hotfixes XS602E005 and XS602E007) You need to apply a new Cloud Support Pack.

- Download the CSP software onto the XenServer host from one of the following links:

- Extract the file:
  ```bash
  # tar xf xenserver-cloud-supp.tgz
  ```

- Run the following script:
  ```bash
  # xe-install-supplemental-pack xenserver-cloud-supp.iso
  ```

- If the XenServer host is part of a zone that uses basic networking, disable Open vSwitch (OVS):
  ```bash
  # xe-switch-network-backend bridge
  ```

(i) Reboot this XenServer host.

(j) Run the following:

```bash
/opt/xensource/bin/setupxenserver.sh
```

**Note:** If the message “mv: cannot stat ‘/etc/cron.daily/logrotate’: No such file or directory” appears, you can safely ignore it.

(k) Run the following:

```bash
```

(l) On each slave host in the Xen pool, repeat these steps, starting from “manually live migrate VMs.”
CHAPTER 4

API Changes Introduced in 4.3

4.1 Hyper-V

<table>
<thead>
<tr>
<th>API</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>addPrimaryStorage</td>
<td>To this existing API, the following field has been added: smb</td>
</tr>
<tr>
<td>addImageStore</td>
<td>To this existing API, the following field has been added: smb</td>
</tr>
</tbody>
</table>

4.2 Reporting CPU Sockets

<table>
<thead>
<tr>
<th>API</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>listhost</td>
<td>To this existing API, the following request parameter has been added: hypervisor.</td>
</tr>
<tr>
<td></td>
<td>The new response parameter added is: cpusockets</td>
</tr>
</tbody>
</table>

4.3 Publishing Alerts Using the Web ROOT Admin API

<table>
<thead>
<tr>
<th>API</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>generateAlert</td>
<td>A new API has been added to generate and publish alerts for usage services. The usage services can be installed on a different host or the same host where the Management Server is running. This API is available only to the Root Admin.</td>
</tr>
<tr>
<td>listAlerts</td>
<td>To this existing API, a new response parameter has been added: name. An alert can be searched on the basis of alert name.</td>
</tr>
</tbody>
</table>

4.4 Dynamic Compute Offering

<table>
<thead>
<tr>
<th>API</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DeployVM</td>
<td>To this existing API, the following request parameter has been added: details.</td>
</tr>
<tr>
<td>ScaleVM</td>
<td>To this existing API, the following request parameter has been added: details.</td>
</tr>
<tr>
<td>ScaleSystemVM</td>
<td>To this existing API, the following request parameter has been added: details.</td>
</tr>
<tr>
<td>UpgradeVM</td>
<td>To this existing API, the following request parameter has been added: details.</td>
</tr>
<tr>
<td>UpgradeSystemVM</td>
<td>To this existing API, the following request parameter has been added: details.</td>
</tr>
</tbody>
</table>
## 4.5 Enhanced Upgrade for Virtual Routers

<table>
<thead>
<tr>
<th>API</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>upgradeRouterTemplate</td>
<td>This is a new API which has been added in this release. The following are the request parameters: • id: Upgrade the specified VR • zone_id: Upgrade the VRs in the specified zone. • pod_id: Upgrade the VRs in the specified pod. • cluster_id: Upgrade the VRs in the specified cluster. • domain_id: Upgrade the VRs belonging to the specified domain. • account_id: Upgrade the VRs belonging to the specified account.</td>
</tr>
<tr>
<td>listRouters</td>
<td>For this existing API, the following request parameters has been added: • version: Lists routers by specified version. • zone_id: Lists routers in specified zone. • pod_id: Lists routers in the specified pod. • cluster_id: Lists routers in the specified cluster. • domain_id: Lists routers owned by specified domain. • account: Lists routers owned by specified account. The following response parameters has been added: • version: (String) The router version. For example, 4.3.0. • requiresupgrade: (Boolean) The flag to indicate if the router template requires an upgrade.</td>
</tr>
</tbody>
</table>